Configuration Management Requirements

International Space Station Program

Revision A
June 22, 2000

National Aeronautics and Space Administration
International Space Station Program
Johnson Space Center
Houston, Texas
Contract No. NAS15-10000

REVISION AND HISTORY PAGE

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SPACE STATION PROGRAM OFFICE

SPACE STATION PROGRAM CONFIGURATION MANAGEMENT REQUIREMENTS

PREFACE

This document defines the requirements and responsibilities to be used by all offices of the International Space Station Program in configuration management.

The contents of this document are intended to be consistent with the tasks and products to be prepared by Program participants. The SSP 41170, Configuration Management Requirements shall be implemented on all new ISS contractual and internal activities and shall be included in any existing contracts through contract changes. This document is under the control of the Space Station Control Board, and any changes or revisions will be approved by the Program Manager.

/s/Arthur Bond	3/30/94
Space Station Control Board, Executive Secretary	Date
International Space Station	

CONCURRENCE

INTERNATIONAL SPACE STATION PROGRAM

CONFIGURATION MANAGEMENT REQUIREMENTS

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SPACE STATION PROGRAM OFFICE

SPACE STATION PROGRAM CONFIGURATION MANAGEMENT REQUIREMENTS

LIST OF CHANGES

All changes to paragraphs, tables, and figures in this document are shown below:

SSCBD	ENTRY DATE	CHANGE	PARAGRAPHS
		Baseline Issue ALL	
000145	11-21-95	ECP 000145	2.0, 2.1, 3.4, 3.4.3.2, 3.4.3.3, 3.6.1.1.3, 3.6.1.1.5
000263	02-05-97	ECP 000263	3.3.1.2.5
000701	06-30-98	ECP 000701	3.4.3.3
000356	06-30-98	ECP 000356	3.3.2, 3.3.2.1, 3.3.2.2, 3.3.2.3
000366	06-30-98	ECP 000366	3.6.1.1.4, 3.6.1.1.5
000561	11-13-98	ECP 000561	3.3.2.2, 3.3.2.3, 3.3.2.4
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002834	02-24-00	SSCN 002834	3.4.8, 3.4.8.1, 3.4.8.1.1, 3.4.8.1.2, 3.4.8.1.3, 3.4.8.2, 3.4.8.3, 3.4.12, 3.4.13
002102	05-26-99	SSCN 2102	N/A (Superceded by SSCN 002834)
002387	04-10-00	SSCN 002387	COMPLETE REVISION

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1.0 INTRODUCTION

All Program level Configuration Management (CM) requirements for the International Space Station (ISS) Program are contained herein.

1.1 PURPOSE

This document defines the requirements and responsibilities, for the application of configuration management to the ISS Program. Abbreviations and acronyms are defined in Appendix A. Appendix B contains the glossary of terms.

1.2 SCOPE

The requirements and responsibilities defined herein are applicable to the prime contractor, all National Aeronautics and Space Administration (NASA) organizations, and other NASA contracts directly involved in the ISS. The requirements listed herein are applicable to the design and development phase and will be modified as necessary to cover the operations phase. These requirements are applicable to all Space Station flight and ground systems hardware, software, and attendant documentation. Procedures to implement these requirements shall be detailed in the respective Configuration Management Plan and an ISS Configuration Management Handbook which will contain a detailed ISS integrated change process.

1.3 STANDARD LANGUAGE

English shall be the oral and written standard language for the design, development, operations, and utilization of the Space Station Program and shall be used when information is required to be exchanged between or among Space Station Program participants.

1.4 STANDARD UNITS OF MEASURE

The Space Station Program, with the exception of the International Partners and the Italian Space Agency, shall utilize the conventional [as currently used in the United States (U. S.)] inch-pound system of units of measure for development of the Space Station. The International Partners and the Italian Space Agency will use the inch-pound system of units for definition of interfaces with Space Station elements, systems, and payloads (with the International System of Units in metric equivalent in parentheses). Exceptions will be granted to use the International System of Measurement units when it is in the best interest of the Program and/or consistent with national policy favoring voluntary metrication by industry.

2.0 APPLICABLE DOCUMENTS

The following documents shown include specifications, models, standards, guidelines, handbooks, and other special publications. The current issue of the following documents is identified in SSP 50257, Program Controlled Document Index. The documents listed in this paragraph are applicable to the extent specified herein. The references show where each applicable document is cited in this document.

DOCUMENT NO.	TITLE
SSP 30459 Reference	Space Station Interface Development Process Requirements Paragraph 3.3.3.2
SSP 30695 Reference	Acceptance Data Package Requirements Specification Paragraph 3.6.1.2.2
SSP 41171 Reference	Preparation of Program-Unique Specifications Paragraph 3.3.2.1, 3.3.2.2, 3.3.3.1, 3.4.3.3
SSP 41172 Reference	Qualification and Acceptance Environment Test Requirements Paragraph 3.3.3.1
DOD-STD-100 References	Engineering Drawing Practices Paragraphs 3.3.1.2.2, 3.3.1.2.3
DOD-D-1000 Reference	Drawings, Engineering and Associated Lists Paragraph 3.3.1.2.5
DOD-STD-2167 References	Defense System Software Development Paragraph 3.3.1.1.2
MIL-STD-130 Reference	Identification Marking of U.S. Military Property Paragraph 3.3.1.2.4
MIL-STD-480 References	Configuration Control - Engineering Changes, Deviations and Waivers Paragraphs 3.4.3.3, 3.4.4, 3.4.5.1.1
MIL-STD-483 Reference	Configuration Management Practices for Systems, Equipment, Munitions and Computer Programs Paragraphs 3.3.1.1, 3.3.1.1.1, 3.3.1.1.2
MIL-STD-1521 References	Technical Reviews and Audits for Systems, Equipments, and Computer Software Paragraphs 3.6.1.1.3, 3.6.1.1.4, 3.6.1.2.1, 3.6.1.2.2, 3.6.1.3.1
MIL-T-31000 References	Technical Data Packages, General Specifications for, (Para 3.6.4) Paragraph 3.3.1.2.5

2.1 REFERENCE DOCUMENTS

The following documents contain supplemental information to guide the user in the application of this document. These reference documents may or may not be specifically cited within the text of this document. When cited, the references will show where the document is cited within this document.

SSP 41000	System Specification for the International Space Station
Reference	Paragraphs 3.0, 3.3.2.4
SSP 41162	Segment Specification for the USOS
Reference	Paragraph 3.3.2.4
SSP 41172	Qualification and Acceptance Environment Test Requirements
Reference	Paragraph 3.3.3.1
SSP 50123	ISS Configuration Management Handbook
Reference	Paragraph 3.4, 3.4.3.2, 3.4.3.3
SSP 50290	PIDS for Node 2
Reference	Paragraph 3.3.2.4
SSP 57001	Pressurized Payloads Hardware ICD Template
Reference	Paragraph 3.4.3.3

3.0 CONFIGURATION MANAGEMENT REQUIREMENTS

The fundamental concept of CM is to establish a baseline of requirements that serves as a point of departure for controlling subsequent changes to the baseline, perform reviews which verify that the previously established baseline requirements are included in the design and development of program configuration items, implement a disciplined system to control changes to the established baselines, establish an accounting system which identifies the baseline and tracks changes and change actions thereto, and provide for audits of the CM system to ensure that the system is functioning properly in accordance with the baselined requirements.

Due to the nature of a development program, baselines are established in an incremental manner as specific items are developed. A major CM task in the baseline process is to identify the technical documentation which defines the approved configuration of an end item or assembly throughout its development period. Based on the design reviews performed, a baseline for a given Configuration Item (CI) evolves from baseline requirements to baseline detail drawings and as these documents are approved they become the recorded baseline for that CI. The configuration of an end item at any point is identified by the original baseline configuration plus all subsequent changes approved and incorporated after that time.

The evolutionary steps of baseline establishment are normally accomplished through a series of design reviews and inspections which verify that progressive designs and fabrication fulfill the purpose and intent expressed in the original requirements documents. The Preliminary Design Review (PDR) generally is to verify that the initial design concepts and technical specifications comply with the basic requirements documentation. At this point the baseline progresses from the approved requirements document to the approved specification which becomes the baseline for detail design. A Critical Design Review (CDR) verifies that the detail design as reflected by detail drawings fulfills the requirements of the technical specification. Once a CI is fabricated, a Functional Configuration Audit (FCA) and a Physical Configuration Audit (PCA) are conducted to verify that the CI is built as specified by the drawings and requirements and serves as the basis for acceptance of the CI. At this point, the baseline advances to the exact description of the item depicted by the detail drawings and specifications, i.e., the "as-built" configuration. During the period of this progressive baselining, it will become necessary to change or update some requirements of the approved baselines. Control of these changes to the program hardware/software baselines is achieved through a change control system, that requires a systematic evaluation, coordination and disposition of proposed changes to any baseline. This is the key to a successful CM system.

Formal control of the configuration of hardware or software begins with establishment of the initial requirements baseline and continues throughout the program life cycle. Proposed changes are defined and identified by formal Space Station Change Memos which are formatted to provide the information necessary for a thorough evaluation and assessment of the program impact that will occur if the change is approved. These Change Memos are submitted to a configuration control board or the functional body responsible for dispositioning the change. Various management levels of control are established for defining baselines and controlling changes. These levels of control are reflected the ISS Panel/Board structure which have been delegated responsibilities from a higher management

level. It is the responsibility of the appropriate ISS Panel/Board to consider the requirement for a change, assess the impact of making the change and make the decision to approve or disapprove the change.

Once a change is initiated, an accounting system is needed which identifies and tracks the change throughout its evaluation, disposition and, if approved, its implementation and baseline update. This system must be capable of identifying each change by a control number, reporting its status in the evaluation, disposition, and implementation cycle and providing assurance that approved changes are incorporated and baselines are updated to reflect the revised requirement, configuration, etc. The accounting system also tracks the program baselines by identifying all documents which have been formally baselined and records all approved baseline changes. The configuration accounting system provides the important management functions of, (a) recording the exact approved baseline and all changes thereto, and (b) providing management personnel the visibility necessary for follow-up action to assure that approved change actions are being implemented as directed.

The CM system established for the ISS Program follows this progression of activities and events by: (1) establishment of an initial requirements baseline as reflected by SSP 41000, System Specification for the Space Station and a series of segment specifications which subsequently is expanded to include configuration item specifications. This baseline eventually incorporates hardware drawings and software code and programs which represent the delivered CIs, (2) performance of CM reviews such as System Requirements Reviews (SRRs), System Design Reviews (SDRs), PDRs, CDRs, FCAs, and PCAs which verify that requirements have been incorporated and implemented into the evolving detail baseline, (3) implementation of a change control system for identifying, evaluating, dispositioning, and implementing proposed changes to the established baseline, and (4) provision for periodic audits of the CM system to assure the overall requirements and objectives of the CM system are being accomplished throughout the program.

3.1 OBJECTIVES

The overall objectives of the Space Station Program CM system are to establish a baseline that identifies program requirements, to implement a system for control of changes to that baseline, to provide a means to track the baseline and changes thereto, and to verify that the configuration of the CIs conform to the established baseline or that differences are identified and resolved. The specific objectives of the Program CM system are to:

3.1.A Ensure the identification and documentation of Program CI management and technical requirements that accurately and completely specify the program needs, including hardware and software requirements. See paragraph 3.3, Configuration Identification.

3.1.B Ensure the establishment of a series of technical reviews which verify requirements implementation and define configuration baselines to provide an orderly and accurate transition from hardware/software technical requirements through design and production of the CI. See paragraph 3.6, Configuration Verification.

3.1.C Ensure the establishment and implementation of an effective control system which documents and controls technical requirements, associated configuration baselines, and provides a disciplined process for evaluating and implementing changes to the baselines. See paragraph 3.4, Configuration Control.

3.1.D Ensure the establishment and implementation of a configuration accounting system which records and reports the information required to maintain an accurate status of the established baselines and all approved changes thereto. See paragraph 3.5, Configuration Accounting.

3.1.E Ensure that each as-built configuration item is in agreement with the released engineering data and that this data is retained to document the exact configuration of each CI/Computer Software Configuration Item (CSCI). See paragraph 3.6, Configuration Verification.

3.2 AUTHORITIES AND RESPONSIBILITIES

Authorities and responsibilities are as follows:

3.2.1 SPACE STATION PROGRAM MANAGER

The NASA Program Manager shall establish policies and provide the overall management direction required to conduct CM for the Space Station Program in such a manner as to achieve the objectives set forth in paragraph 3.1 of this document. These authorities and responsibilities include, but are not limited to, the following:

3.2.1.A Establish the NASA Program Office CM and Space Station change control board function and identify control authority for the appropriate panel/board.

3.2.1.B Identify participants for the change control function of the Space Station Control Board (SSCB).

3.2.1.C Serve as Chair of the SSCB, with final SSCB decision authority for all matters brought before the Board that require Program Office approval. Actions that require Program Level approval shall be forwarded to the Program Director with recommended action.

3.2.1.D Designate a Deputy Chair to act in his/her absence with full decision authority.

3.2.1.E Formalize all SSCB actions by signature on Change Directives documenting actions.

3.2.1.F Function as the official Space Station Program interface contact for Space Shuttle Program (SSP) and International Partner activities.

3.2.1.G Schedule and conduct Program Reviews and audits.

3.2.1.H Support joint NASA/International Partner audits and reviews as defined in the joint CM documents.

3.2.1.I Establish, maintain, and control programmatic baselines and schedules and changes thereto.

3.2.2 INTERNATIONAL PARTNER MANAGERS

International Partner responsibilities shall be as defined in the International Joint Management Plans. International Partners will develop a database management system and configuration control system to provide visibility/traceability for verification across Space Station Program participant boundaries.

3.2.3 PROGRAM CONFIGURATION MANAGEMENT

The NASA Program Configuration Management Manager has responsibility for:

3.2.3.A Establishing Space Station CM requirements, procedures, and operating methods.

3.2.3.B Assuring compatibility of all CM systems.

3.2.3.C Establishing and maintaining the program baselines.

3.2.3.D Providing the Executive Secretary for the SSCB change control function.

3.2.3.D.1 Documenting decisions of Chair by issuing Change Directives.

3.2.3.D.2 Preparing and issuing change review agenda and minutes.

3.2.3.D.3 Assuring that follow-up and closeout action has been taken on the change directives.

3.2.4 NASA PROGRAM PARTICIPANTS CONFIGURATION MANAGEMENT

NASA Program Participants that are tasked by the ISS Program Manager for support to the ISS Program by Memo Of Understanding or in-line task agreements shall develop configuration management processes to implement the Program CM requirements. Program Participants for operation support shall meet the intent of the Program CM requirements. Where tailoring of the CM requirements is necessary to meet existing established CM processes for Operations activities, this will be documented in the Program Participants Configuration Management Plans. The specific tailoring shall be reviewed and concurred by the NASA CM Manager.

3.3 CONFIGURATION IDENTIFICATION

Configuration identification is (1) the task of describing the requirements for the configuration of all program hardware, software and data, and (2) the documentation of these descriptions. Configuration identification for the Program shall be accomplished through the development of formal documentation, defined herein, which shall describe the baseline to be used for controlling program requirements.

3.3.1 CONFIGURATION ITEMS AND CONTRACT END ITEMS

CIs/CSCIs represent an aggregation of hardware/software, or any of its discrete portions which satisfies an end use function. Those system elements whose functions and performance parameters must be defined and controlled to achieve the overall system performance shall be defined as CIs. A Contract End Item (CEI) is a CI/CSCI which has been identified in the contract as a deliverable entity. A CEI may be a separate CI, a separate CSCI, or an aggregate of CIs/CSCIs grouped as a set (of parts or kit) to be delivered to satisfy the contract.

3.3.1.1 CONFIGURATION ITEM SELECTION

Configuration items shall be selected in accordance with MIL-STD-483, Appendix XVII to establish and maintain configuration traceability for physical items (e.g. equipment, components, software) and identifying documents, whose functions and performance parameters must be defined and controlled to achieve the overall end use function and performance. The configuration item must be a manageable level of assembly. The selection process separates the elements of a system into individually identified subsets for the purpose of managing their development.

3.3.1.1.1 HARDWARE CONFIGURATION ITEMS

Hardware CIs for deliverable items shall be identified and selected in accordance with the criteria established in MIL-STD-483. The final confirmation of CI identification for deliverable items is accomplished during the applicable subsystem hardware PDR.

3.3.1.1.2 COMPUTER SOFTWARE CONFIGURATION ITEMS

Computer Software Configuration Items for deliverable items shall be initially identified and selected in accordance with MIL-STD-483 and DOD-STD-2167. The control CSCI code and corresponding documentation shall be progressively accomplished through the establishment of formal and internal software baselines in accordance with DOD-STD-2167. Each CSCI version and each block release shall be uniquely identified and controlled. The final confirmation of CSCI identification for deliverable items shall be accomplished during the applicable subsystem software PDR.

Each CSCI shall be documented by an individual Version Description Document (VDD). VDDs shall provide software identification for subsequent engineering release and update/change, configuration status accounting, and

configuration traceability. Once released, the VDD will define the deliverable software end item. VDDs shall be prepared in accordance with MIL-STD-2167.

3.3.1.2 IDENTIFICATION NUMBERING

3.3.1.2.1 CONFIGURATION ITEM NUMBERS

Configuration Item numbers shall be assigned by the responsible design activity to all CI/CSCIs identified as described in paragraph 3.3.1.1 above.

3.3.1.2.2 DRAWING AND PART NUMBERS

Drawing and Part number identification for hardware and software items shall be established in accordance with DOD-STD-100, except as tailored below:

- With the exception of Remotely Programmable Firmware, all firmware resident in computers or processors (Hardware items) shall be identified under one part number that defines the hardware item as well as the embedded resident firmware. Thus the firmware part number is an integral part of the configuration definition of the hardware item in which it resides.

- Remotely Programmable Firmware (RPF) is defined as firmware which can be loaded into a piece of flight hardware remotely, without either disassembly of the hardware item that contains the RPF or removal of the hardware item from its application (operational usage). In this case, RPF will be treated as software and controlled by the unique source code version identifier (e.g., software part number) as defined in the Version Description Document (VDD). The RPF part number will not be part of the configuration definition of the hardware item in which it resides.

Part number re-identification for hardware and software items shall be established in accordance with DOD-STD-100, as tailored below:

- For all items, whether hardware, software, firmware, or RPF; part numbers shall be changed whenever the part is revised such that it is no longer interchangeable.

- Part numbers shall be changed from the affected part/assembly up to and including the level where interchangeability is re-established.

- Drawings shall be revised to reflect part number re-identification up to and including the level where interchangeability is re-established.

- The modification of RPF will require a part number change to the RPF; however, the hardware item that contains the RPF part number will not change because of a change to the RPF. Thus any changes to the RPF are never reflected in the hardware item and do not cause a re-identification of the hardware item's part number.

For all other firmware, the firmware part number is a part of the design configuration of the hardware item that contains the firmware. Thus any changes to the firmware shall be reflected in the hardware item, causing a re-identification of the hardware item's part number.

3.3.1.2.3 SERIAL AND LOT NUMBERS

Serial numbers shall be assigned in accordance with DOD-STD-100, and shall be sequential, non-repeating and never changed or reassigned. If an item goes out of existence (i.e. scrapped), the serial number for that item shall not be reused.

3.3.1.2.4 NAMEPLATES

Nameplates and product markings shall be applied in accordance with the intent of MIL-STD-130 and the applicable product drawings.

3.3.1.2.5 COMMERCIAL OFF-THE-SHELF ITEMS

A commercial item is defined as a product, material, component, sub-system or system sold or traded to the general public in the course of normal business operations at prices based on established catalog or market prices. When it is impractical to prepare a Procurement Control Drawing or not possible to obtain DOD-D 1000 Level 3 design disclosure drawings for such an item, commercial documentation in the form of catalog, specification sheets or drawings for such an item, commercial documentation in the form of catalog, specification sheets or drawings prepared in accordance with the manufacturer's internal procedures shall be obtained. The data shall meet the intent of paragraph 3.6.4 of MIL-T-31000 and item shall be identified on the applicable contractor Design Center's installing parts list by the manufacturer's part number and CAGE code (or name and address if no CAGE code has been assigned).

3.3.2 CONFIGURATION BASELINES

Configuration Baselines, plus approved changes from those Baselines, define the established configuration identification by which items are controlled. The Configuration Baselines for deliverable CIs shall be developed and maintained utilizing Functional, Allocated, and Product baselines. These ISS program baselines, described herein are established by the NASA Program Office with its contractors/design activities, consist of Prime and Non-Prime sections. The Prime section consists of those baseline documents applicable to the ISS Prime Contractor and its subcontractors. The Non-Prime section consists of those baseline documents representing the hardware and software that is either developed by NASA or its GFE providers, or developed by the International Partners. NASA contractors/design activities shall be responsible for the establishment and maintenance of baselines with their subcontractor/contractors in support of Program baseline activity. The configuration baselines for nondeliverable items will be developed by the applicable Design Center utilizing internal specifications, requirements memos, and other documents. Nondeliverable items will not be identified under Functional, Allocated, or Product baselines.

3.3.2.1 FUNCTIONAL BASELINE

The Functional Baseline consists of the Space Station System Specification, the System/Segment Specifications and the Stage Addendum Specifications as well as the Interface Control Documents (ICDs) with the International Partners and external programs. This documentation shall define the Functional Baseline as follows: (1) at the System level by describing the system's functional and interface characteristics, the designation of major segment's characteristics, and the verification required to demonstrate the achievement of those specified functional characteristics; and (2) at the Segment level by describing the segment's functional and interface characteristics, the designation of major CI characteristics, and the verification required to demonstrate the achievement of those specified functional characteristics.

The Functional Baseline shall be established upon baselining of the Space Station System Specification by NASA and expanded at SDR to include baselined Segment Specifications and System Segment Level IRDs (a.k.a. Inter-Segment ICD (Part 1) and External ICDs). All changes to the Functional Baseline will be processed under NASA change control.

To provide a vehicle for contractually documenting the NASA/Prime Contractor agreements, the Segment Specification will document developmental GFE items within the segment, in accordance with SSP 41171, paragraph 4.4.3.12.

3.3.2.2 ALLOCATED BASELINE

The Allocated Baseline shall be defined by the Type B Development Specifications and related documentation, that have been approved and authenticated by NASA. This approval and authentication is accomplished when NASA signs the applicable CEI FCA certificate. The Allocated Baseline describes the functional and interface characteristics of CIs as allocated from those of the system level, and the verification methods/tests required to demonstrate achievement of each specified functional characteristic.

The Allocated Baseline is segregated into two sections (1) Prime and (2) Non-Prime.

- The Prime section of the Allocated Baseline consists of the Developmental Specifications, as defined in SSP 41171 (paragraph 4.1.1 and subs) and related documentation that describe the major components of the US On-orbit Segment, known as Contract End Items (CEIs).

- The Non-Prime section of the Allocated baseline:

  - Consists of three major sections (1) the NASA controlled documentation that represents items provided to the Prime Contractor as GFE representing subtiered CIs included in the Prime Allocated Baseline, (2) the Developmental Specifications, as defined in SSP 41171 (or NASA approved equivalent) and related documentation that describe the major components of the Non-Prime Segment(s), and (3) applicable portions of the International Joint Baselines as described in paragraph 3.3.2.4.

  - Shall include joint documents between NASA and each GFE provider. These documents shall be approved by the NASA ISS Program to establish and control the allocated requirements between NASA and each

- GFE provider. For that portion of this baseline that represents GFE components of the Prime Allocated Baseline, the Prime Contractor Design Centers will document requirements allocations in their Development Specifications.

The NASA Controlled Allocated Baselines applicable to a CI shall be established following successful completion of the FCA for the applicable higher level CEI. Following the CEI FCA, all Allocated Baseline documentation shall be under NASA Class I Change Control, meaning that changes to the Allocated Baseline documents shall only be accomplished via a NASA approved Class I change.

Prior to NASA control of the Prime section of the Allocated baseline of the applicable Contract End Item (CEI), the Prime contractor shall control Development Specifications, and Inter-Segment ICDs (Part I) with the Design Centers as they become mature approximately at PDR and CDR for the CEIs and at DD 250 of the applicable subtier Configuration Items (CIs) delivered to NASA for use in Node 2. The common items currently under development for Node 2 (subtier CIs) will also be delivered to NASA to support NASA's development of Node 2. The Design Centers shall continue to maintain control over the allocated baseline of these items until component DD 250 of that CI, or FCA/PCA of another element of which the CI is a component, whichever is first. If Node 2 is the first CEI application for a component CI, then the Prime-Design Centers shall maintain control of the component CI baseline until DD250 of the component to NASA. Prior to this, NASA/MSFC and ASI/Alenia shall be notified of all changes to the CI's allocated baseline documentation in accordance with the Prime Statement of Work. Should either NASA/MFSC or ASI/Alenia not be able to accept the change, NASA/JSC shall provide direction to the Prime via a Class I change to modify the applicable CI's allocated baseline documentation.

3.3.2.3 PRODUCT BASELINE

The Product Baseline shall be defined by the CI Type C Specification or the applicable combination of the Acceptance Requirements and Acceptance Test Procedures (ATPs), Engineering Drawings, Associated Lists, Software Design Documents (SDDs), Version Description Documents (VDDs) Inter-Segment Part II ICDs, and Intra-Segment Part II ICDs.

The Product Baseline is segregated into two sections (1) Prime and (2) Non-Prime.

- The Prime section of the Product Baseline consists of the Type C Specification or equivalent related documentation, as identified above that describe the major components of the US On-orbit Segment, known as CEIs, and subtiered CIs/CSCIs.

- The Non-Prime section of the Product Baseline consists of three major sections (1) the NASA controlled documentation that represents items provided to the Prime Contractor as GFE representing CIs or subcomponents of CEIs/CIs included in the Prime Product Baseline, (2) the Type C Specification as defined in SSP 41171 (or NASA approved equivalent) and related documentation that describe the major components of the Non-Prime Segment(s), and (3) applicable portions of the International Joint Baselines as described in paragraph 3.3.2.4.

The Product Baseline describes all the necessary functional and physical characteristics of the CI, interoperability characteristics, and the characteristics designated for production acceptance testing. The Product Baseline shall be established and transferred to NASA control for (1) a CI following successful completion of the PCA of the applicable CEI as identified in Appendix C, or (2) a Node 2 delivered component/CI following successful delivery to NASA via DD250 and shall reflect the accepted CI configuration as documented by the Acceptance Data Package (ADP).

Following the PCA at the CEI level, all changes to the Product Baseline of the CEI and Subtiered CIs and CSCIs will be under NASA change control.

- Changes to the documentation (i. e., Top Assembly Drawings, Associated Parts Lists, Acceptance Test Procedure, and Part II ICDs) describing the CI's top assembly level product baseline or the equivalent documentation (i.e., Software Product Specification (SPS), Version Description Document (VDD), Software Users Manual (SUM), Product Test Documentation, and Part II ICDs) for a CSCI, will be controlled via a NASA approved Class I change.

- Changes to documentation below the CI's top assembly level product baseline will be classified in accordance with paragraph 3.4.4.

NASA shall baseline and control Inter-Segment ICD, Part 2's prior to FCA of the interfacing segments, elements, or Configuration Items (CIs).

Prior to NASA baseline control of the product baseline for the applicable Contract End Item (CEI), the Prime Contractor shall baseline the remaining ICDs with the Design Centers as they become mature following CDR, and baseline the remaining product baseline documentation at FCA/PCA for the applicable CEI and at DD 250 for Configuration Items delivered to NASA to support NASA's development of Node 2. The Design Centers shall continue to maintain control over the product baseline of these items until completion of component DD 250 of that CI, or FCA/PCA of another element of which the CI is a component, whichever is first. If Node 2 is the first CEI application for a component CI, then the Prime Design Center shall maintain control of the component CI baseline until DD 250 of the component. Prior to this, NASA/MSFC and ASI/Alenia shall be notified of all changes to the CI's Product Baseline documentation, in accordance with the Prime Statement of Work. Should either NASA/MSFC or ASI/Alenia not be able to accept the change, NASA/JSC shall provide direction to the Prime via a Class I change to modify the applicable CI's Product baseline documentation.

3.3.2.4 INTERNATIONAL PARTNERS JOINT BASELINE

Joint documents between NASA and each International Partner shall be prepared and jointly approved to establish and control joint requirements between NASA and each International partner. Applicable portions of SSP 41000, System Specification for the Space Station, the Segment Specifications and IRDs define the functional baseline with the International Partners.

Node 2 is a major component of the US On-orbit Segment as defined in SSP 41162 which is now under the design responsibility of NASA, and provided as a Government Furnished Equipment (GFE) component of the USOS. The

applicable portions of SSP 41162, SSP 50290 "Node 2 PIDS" and applicable ICDs forms the Allocated baseline with NASA. These baseline documents are jointly controlled by NASA and Prime Contractor. However, the Prime Contractor Design Centers will be providing common item hardware and software as defined in ECP 000561. The applicable baseline documentation describing those common items that are being developed by the Prime Contractor Design Centers shall remain under Prime Contractor Design Center Internal control until after establishment of the applicable CEI NASA Allocated and Product baselines, as described in paragraphs 3.3.2.2 and 3.3.2.3, above.

3.3.3 NASA PROGRAM OFFICE BASELINE DOCUMENTATION

3.3.3.1 PROGRAM SPECIFICATIONS

Technical specifications identified to establish the functional, allocated, and product baselines shall be prepared in accordance with SSP 41171. The Type A specifications shall be prepared by NASA and baselined by the Program Manager for inclusion in the prime contract as the contract technical requirements. The Type B and C specifications shall be prepared by the Prime Contractor for evaluation, approval, and baselining as defined in paragraphs 3.3.2.2 and 3.3.2.3.

As an option to development of Type C specifications, the design activity shall develop and implement an approach to acceptance testing including the documentation of Acceptance Requirements and Acceptance Test Procedures (ATPs). The test procedures will be based on the qualification requirements and procedures as well as SSP 41172, ISS Program Qualification and Acceptance Environment Test Requirement. The Acceptance Requirements and Test Procedures shall be delivered as part of the Acceptance Data Package (ADP) and baselined at PCA.

All baselined Type A, B and C (or Acceptance Requirements and ATPs) specifications shall be controlled and maintained through the configuration control requirements of Section 3.4.

NASA program management requirements documents shall be approved by the Program Manager for implementation by program organizations and by the Prime Contractor via contract direction. Maintenance of these documents shall be by Change Directive from the Program Manager for release of Document Change Notices (DCNs) for documents under configuration control.

3.3.3.2 INTERFACE DEFINITION

Space Station ICDs shall identify, define, document and control the physical, electrical, environmental and functional requirements, characteristics and constraints that exist at a common boundary between two system segments/equipments, where system segments/equipments are defined by the demarcation of contractual or program responsibilities. The interface control program shall be designed to promote reliable systematic management of technical control and administrative interface compatibility. ICDs shall be prepared for all program interfaces between U.S. and International Partner segments and between the Space Station and other NASA organizations

interfacing with the Space Station Program. ICDs shall be in accordance with SSP 30459, International Space Station Interface Control Plan.

3.3.3.3 INTERFACE CONTROL

Interface control documentation shall be scheduled and developed to support program milestones and contract requirements. ICDs shall contain the detailed interface design of the interfacing system segments, and will be complete prior to the CDR for the applicable subsystem(s). Traceability of interface requirements/parameters shall be maintained via identifications on design drawings and an interface document/design drawing matrix.

These identifications or notes on design drawings shall clearly indicate that the drawing contains design parameters that are controlled by an ICD and the drawing can not be changed without approval from the responsible configuration management function.

3.3.4 REQUIREMENTS TRACEABILITY

Design requirements shall be traceable to higher, lower, and related requirements. Requirements shall be traced down from the System specification through Configuration Item (CI) specifications at the end item level.

An automated system shall be utilized that provides retrieval of traceability links both vertically and horizontally through the levels of requirements hierarchy to provide and facilitate traceability of requirements.

3.3.5 NASA DESIGN ACTIVITY/PRIME CONTRACTOR BASELINE

The NASA Design Activity/Prime contractor baseline shall implement the allocated portion of the requirements of the NASA Program baseline requirements plus additional requirements defined by the design activity/contractor, such as those incorporated in CI/CSCI specifications and engineering drawings as concurred on by NASA following the appropriate design reviews [i.e., Preliminary Design Reviews (PDRs)s and CDRs]. Baseline configuration documentation shall be controlled in accordance with the requirements contained herein. The configuration baseline shall be described and identified in specification trees/lists, drawing trees/lists, and documentation trees/lists. The baseline shall be controlled by the Prime Contractor or NASA design activity with the current baseline status identified within the configuration accounting system. The baseline documentation shall be controlled by the design activity/contractor's engineering release process as defined in their respective Configuration Management Plans, within the constraints established in paragraphs 3.3.2.2 and 3.3.2.3.

3.4 CONFIGURATION CONTROL

After a baseline is established, it is essential that effective positive control be established to preclude any unauthorized changes to that baseline. There must be procedures that ensure each proposed change to the baseline is completely described (including impacts); is thoroughly coordinated prior to submittal, reviewed, and evaluated; and

is authorized and implemented in an approved manner. The Prime Contractor or NASA organizations shall only accept a baseline change that has been processed and approved in this prescribed manner. The Prime Contractor will implement the configuration control function as documented in SSP 50123, ISS Configuration Management Handbook.

Control of the Space Station configuration baselines and changes thereto is to be exercised by the appropriate NASA panel/board as defined by the Program Manger. Change initiation and control shall be delegated to the lowest level NASA panel/board having sole responsibility for total implementation of the change.

3.4.1 CHANGE CONTROL (CHANGE DOCUMENTATION)

Change documentation, identified within this paragraph, shall be utilized to define and approve changes.

3.4.1.1 SPACE STATION CHANGE MEMOS

Space Station Change Memos (SSCMs) shall be prepared to identify and describe a proposed change from NASA to the Prime Contractor/International Partners and internal NASA organizations. The Space Station Change Memo will utilize a common format for use by all participants.

3.4.1.2 ENGINEERING CHANGE PROPOSAL

An Engineering Change Proposal (ECP) shall be utilized to propose engineering changes to the NASA approved engineering baseline.

3.4.1.3 PROGRAM CHANGE PROPOSAL

Program Change Proposals (PCPs) shall be utilized to propose changes to the Prime contract requirements which do not affect technical baselines

3.4.1.4 SPECIFICATION CHANGE NOTICE

Specification Change Notices (SCNs) shall be utilized to maintain baseline specifications.

3.4.1.5 DOCUMENT CHANGE NOTICE

Document Change Notice (DCNs) shall be utilized to maintain Program approved documentation.

3.4.1.6 INTERFACE REVISION NOTICE

Interface Revision Notices (IRNs) shall be utilized to maintain interface control documentation.

3.4.1.7 DEVIATIONS AND WAIVERS

Deviations and waivers shall be utilized to depart from the requirements of the specified configuration identification prior to manufacture of an item. Waivers shall be utilized if an item does not conform to the approved configuration baseline. Deviations or waivers shall not be used when the requested departure/non-conformance would result in an adverse impact to other program participants. Such requests, complete with Program impact shall be processed as a change in accordance with paragraph 3.4.3 herein.

3.4.2 SPACE STATION CONTROL BOARD

The Space Station Control Board (SSCB) shall be established by the Program Manager as the controlling authority for the Program baseline.

3.4.2.1 AUTHORITY AND RESPONSIBILITIES

The SSCB shall be responsible for formally baselining and controlling the Space Station Program cost, schedule and technical baseline.

The International Partners will be members of the SSCB and will interface with the Program CM process through participation in SSCB activities. The Authority and Responsibilities including membership for the SSCB and any lower level control board delegated NASA baseline and change control authority from the Program Manager shall be defined in ISS Program Management Directives.

3.4.3 CHANGE IDENTIFICATION AND DOCUMENTATION

3.4.3.1 SPACE STATION CHANGE NUMBERING SYSTEM

3.4.3.1.1 The Program shall utilize a uniform numbering system to assure accumulation of all documentation associated with a given change under a single change package identifier. The change package identifier is the Space Station Change Number (SSCN) assigned by CM. In addition all deviations and waivers shall be assigned SSCN numbers. All changes (i.e., CRs, ECPs, and PCPs) shall be assigned an SSCN. The SSCN shall be depicted on all change documentation. All documentation associated with a given change shall be traceable to a common SSCN. This system shall accommodate/facilitate collecting, relating, controlling and storing change package data. The NASA Design Activity/Prime Contractor shall apply change packaging principles, using their change numbering system, to changes affecting their internal baselines.

3.4.3.2 CONTRACTOR ENGINEERING CHANGE PROPOSAL DOCUMENTATION

All changes proposed by the prime contractor, requiring NASA approval shall be documented and submitted utilizing the Prime contractor's ECP format (reference SSP 50123, Appendix C).

3.4.3.3 PROCESSING DEVIATIONS, WAIVERS, AND EXCEPTIONS

Deviations, waivers, and requirements exceptions shall be processed as a program change, i.e. shall be initiated by an ISS Change Request (CR) and dispositioned by the same level of authority that controls the requirement and shall be concurred with by the NASA Program Manager or a Deputy Program Manager. Requests for deviation/waiver/exception to ISS requirements shall be submitted to the NASA Space Station Configuration Management Receipt Desk on an ISS Change Request (CR). When a waiver or exception affects the same requirement which is specified in more that one paragraph/document within the ISS requirements baseline, only one waiver or exception shall be processed, properly identifying all sources against which the waiver or exception shall be applicable. Note: The process for exceptions and waivers applicable to Payloads items is documented in SSP 57001.

All requirements exceptions shall be incorporated into the applicable baselined specification and/or requirements document via a specification change. Specification maintenance requirements and methodology for requirements tailoring and exceptions shall be followed in accordance with SSP 41171.

Upon completion of the prescribed technical evaluation and coordination, any EME/EMI Tailoring Interpretation Agreements (TIAs) or T&V Exception Requests shall be processed on an ISS CR as an exception and incorporated into the applicable requirements documentation in accordance with SSP 41171. All proposed items for inclusion on the Critical Items List (CIL) - CIL waivers, are to be processed via a CR and incorporated into their applicable CIL document. All approved safety hazards documented as Safety Non-Conformance Reports (NCRs) are to be processed via a CR and incorporated into their applicable NCR/Hazards document. As a result of an approved CIL or NCR, any engineering change required to the product engineering, associated lists, ATP etc., shall be identified in the applicable NCR or CIL Directive and the appropriate change shall be initiated.

A deviation is defined as a specific written authorization requested prior to fabrication of the item (by serial number) which grants a specific departure to a contract performance requirement for a temporary period of time.

A waiver is defined as a specific written authorization to accept a non-conforming item(s) which, during production or after having been submitted for inspection post manufacturing, is found to depart from the baselined drawing and a specified performance requirement, but is acceptable for "use as is" or after repair by an approved method.

An exception is defined as a specific written authorization to tailor a general specification requirement applicable to a given Configuration Item (CI) or group of CIs and/or may limit the applicability of the requirement to the item(s). In the case of an exception, the baselined design is found to be technically acceptable although it does not meet an allocated requirement. The non-compliant condition between the design and the requirement is corrected by incorporation of the authorized exception into the applicable requirements documentation.

3.4.3.4 CHANGE PROPOSAL PRE-COORDINATION

Change proposals shall be pre-coordinated by the originator or sponsor with all affected Program participants, including the Prime Contractor, other NASA organizations and International Partners prior to submittal for formal configuration management change processing. Pre-coordination shall ensure that the change is complete, accurate and appropriately classified.

3.4.4 CHANGE CLASSIFICATION

All Program Level Changes shall be classified by Configuration Management as either Class I or Class II in accordance with the requirements of this paragraph:

- Program level changes are defined as those changes that impact ISS Program Controlled/Baseline Documentation, NASA Controlled configuration baselines and/or the modification of items delivered to NASA via DD250, or equivalent.

- Sub-Program-level or internal changes are defined as those changes that impact documentation that is internally controlled within the applicable Prime Contractor/GFE Provider/NASA Design Center. For example, this documentation would include the baseline documentation for a CI that is subtiered to a CEI, but only for the time period from inception of the documentation until the completion of the first applicable CEI FCA/PCA for that CI.

- All Program-level changes shall be classified as either Class I or Class II based upon the impact of the change on ISS program controlled documentation, NASA Controlled Configuration Baselines, and the need to modify delivered items.

Subsequent to the establishment of the applicable NASA Controlled Product Baseline changes shall be classified as either Class I or Class II.

A change shall be classified as Class I when the proposed change affects any of the following:

1. Any NASA Baselined/Contractually invoked document listed in SSP 50257.

2. Any part of the Contract between NASA and the Developer, or

3. Any of the following factors within a NASA Controlled Configuration Baseline document (See paragraphs 3.3.2.1 through 3.3.2.3):

   a. Performance/Technical requirements,

   b. Safety, Reliability, Maintainability, Survivability, and Crew Interface,

   c. Weight, Balance, Moment of Inertia, Resource Allocations, Microgravity, Micrometeoroid OD,

    d.   Interface Characteristics (Part I/II Inter Segment, Intra Segment, Shuttle, and External),

    e.   Government Furnished Equipment, Material, or Services,

    f.   Deliverable operational, test, or logistics documentation/manuals,

    g.   Interchangeability, replaceability, compatibility, interoperability of parts, subassemblies, assemblies, or CIs/CSCIs,

    h.   CI Top Level Assembly Drawings, Parts Lists, and Acceptance Documentation and S/W equivalent documentation,

    i.   Changes to delivered hardware and software,

    j.   Changes requiring the development, validation, and verification of modification packages.

    k.   Changes to sources for CIs or repairable items at any level defined by a Source Control Drawing.

A change shall be classified as a Program Level Class II change when that change does not affect the Class I criteria defined above.

Approval/authorization requirements for changes vary based upon the change classification, as follows:

- Changes classified as Class I shall only be implemented after receipt of formal customer approval.

- Changes classified as Program-level Class II Changes are implemented after Prime Contractor Program Office [i.e., Boeing-Houston Engineering Review Board (ERB)] approval.

- Design Center Internal Changes will be implemented based upon Design Center Level review board approval.

3.4.5 CHANGE PROCESSING

All proposed changes to the baseline must be properly documented, submitted, evaluated, coordinated, and dispositioned in accordance with the requirements of the following subparagraphs.

3.4.5.1 PROGRAM CHANGE PROCESSING

Changes shall be initiated and coordinated by the applicable Design Center identifying the need. Proposed program changes shall be evaluated, dispositioned and approved for implementation by the lowest level team/panel/board which has delegated authority to disposition the change.

3.4.5.1.1 ECPs will be prepared by the Prime Contractor or subcontractor team member using the Space Station Change Memo in lieu of the format identified in MIL-STD-480. ECPs shall identify the technical impact as well as a firm contract cost and schedule impact of the proposed change and include impacts to international partners (except cost data) and other partner agencies (i.e., Shuttle).

3.4.5.1.2 Other NASA centers and International Partners shall utilize Change Requests (CRs)/Space Station Change Memos and submit them to NASA CM.

All CRs/Change Memos shall be sponsored by a SSCB or appropriate NASA Panel/Board representative and shall identify all affected applicable baseline documents.

3.4.6 CHANGE DISPOSITION

The disposition of all change proposals or memos shall be documented on a Change Directive which shall reflect:

3.4.6.A The SSCB decision as to disposition of the change.

3.4.6.B The implementation direction to the party(ies) who implements the change.

3.4.7 NASA DESIGN ACTIVITY/PRIME CONTRACTOR CHANGE CONTROL

3.4.7.1 PRIME CONTRACTOR CHANGE CONTROL

The Prime Contractor shall utilize the organizational structure as described in the Prime Contractor Program Execution Plan to bring proposed program level Class II changes to the Engineering Review Board (ERB) for classification and disposition as program level Class II changes. The Design Center shall have authority to establish configuration baselines as defined in paragraph 3.3.5 which are in scope of the contract provisions.

3.4.7.2 NASA DESIGN ACTIVITY CHANGE CONTROL

NASA Design Activities will establish panels/control boards to control their respective allocation from the Program baseline. These panels/control boards shall be chartered by the Program level SSCB and will be responsive to Program direction and will have the authority to establish and control baselines/changes within their delegated authority when the change does not affect a higher level controlled baseline.

3.4.8 POST DD250/NASA ACCEPTANCE H/W & S/W MODIFICATIONS

Modifications Packages, commonly referred to as Mod Kits, are utilized for the alteration of a delivered end item that results in a physical change to a NASA controlled configuration baseline. This baseline is approved at NASA acceptance of the item. At a minimum Modification Packages shall consist of the necessary instructions, parts, tools, materials, Acceptance Test Procedures (ATPs) and re-test instructions required to install and verify the Mod kit.

3.4.8.1 POST DD250 H/W MODIFICATIONS

All post DD250 H/W modification packages shall be developed and implemented in accordance with the applicable ISS CM Management controlled process and procedures document.

A Time Compliance Technical Instruction (TCTI), or equivalent for GSE, shall be used by the contractor/design agency to provide uniform instructions to the applicable modification installation site.

There are two types of TCTIs used on the ISS Program, they are: Record and Detailed TCTI.

The Record TCTI shall provide a cost effective minimal set of Mod Kit installation instructions referencing the applicable engineering drawings and parts to be used. These TCTIs shall be utilized for incorporation of mod kits on the ground.

The Detailed TCTI shall provide a comprehensive set of step-by-step instructions used for on-orbit installation procedures.

Any change to a modification package, subsequent to NASA acceptance of the package and prior to installation, shall be documented and authorized by either a revision to the original change or by a new change.

3.4.8.1.1 H/W CHANGE REQUIRING A MODIFICATION PACKAGE

Each approved Change shall provide the authorization for the design, development and delivery of the associated Mod Kit to NASA for each H/W item and its affected CEI/CI.

3.4.8.1.2 NUMBERING OF MODIFICATION PACKAGES/TCTIS/INCs

A numbering scheme shall be provided that assures a closed loop system from Mod kit authorization through verification of incorporation. The numbering scheme shall be documented in the CM management controlled documentation.

3.4.8.1.3 H/W MODIFICATION VERIFICATION

The Installation Notification Card (INC) shall be the mechanism for providing verification of hardware incorporation. The INC shall be included in the modification package and shall be completed by the design agency responsible for installation of the Mod Kit. For modifications installed On-Orbit, the notification that the mod kit has been installed shall be provided by the Mission Control Center (MCC) to the NASA/S&MA console in the Mission Evaluation Room (MER). NASA/S&MA will then complete the INC, verifying installation of the On-Orbit Mod Kit and provide the INC to CM. CM shall ensure that the data is recorded in the program configuration status accounting system.

3.4.8.2 H/W MODIFICATION PACKAGE TRACKING REQUIREMENTS

Tracking modification package development, delivery, launch (if applicable), and closure/ verification of the installation shall be provided. NASA-JSC/CM is responsible for tracking modification packages from initial NASA approval, through installation and verification.

As a minimum, the following tracking requirements apply:

- Modification package requirement by CEI/CI number and by serial number effectivity.

- Modification package delivery to NASA complete.

- Modification package installation complete – Completed INC.

- Configuration Status Accounting Database [e.g., Space Station Accounting Verification (SSAV)] updated.

3.4.8.3 POST DD250 S/W MODIFICATIONS

In the case of flight software Post DD250 updates shall be accomplished via a software update package. Software updates shall be documented on an ASCP approved CR/CD. The software shall be installed in accordance with the installation instructions, which are normally referenced in the Data Transmittal Form (DTF). The DTF shall be used to formally deliver the software as "Data." The installation instructions shall reference the Version Description Document (VDD) and the attached Patch Description Data (PDD) report. The DTF will have an attached hardcopy PDD report, which shall provide the necessary instructions covering the installation of the software update package, supplemented by the VDD, as required. It shall be used to provide the user with pertinent information that may be necessary during loading of the pre-positioned load (PPL), data patch, or code patch.

3.4.9 ENGINEERING RELEASE SYSTEM

The contractor/NASA design activity shall implement a process for release of engineering documentation which operates under policies and procedures approved by the contractor/NASA design activity CM function and satisfies the following requirements:

3.4.9.A Assures that specification and drawing releases are compatible with the authorized specification tree or drawing list.

3.4.9.B Provides positive control to preclude unauthorized release of changes to established baselines and formally released engineering documentation.

3.4.9.C Provides status of released engineering documentation.

3.4.9.D Assures releases are traceable to the change number/contract authorization.

3.4.9.E Assures verification of change authorization status prior to engineering release.

3.4.9.F Status completion of engineering release activity and assure that once a change is declared complete no additional engineering will be released.

3.4.10 IDENTIFICATION AND CONTROL OF OPEN WORK

Open/deferred work, relative to flight hardware or software and associated Ground Support Equipment (GSE), shall be identified in the ADP. Completion dates for all open work shall be coordinated with the SSCB prior to shipment or at the Acceptance Review.

3.4.10.1 PRE-PLANNED OR ASSIGNED WORK IDENTIFICATION

Pre-planned or assigned work includes that work required to configure the end items from the as delivered configuration defined by the delivery ADP to the configuration specified by engineering drawings, e.g., the flight configuration for Space Station flight hardware or software or the design configuration for associated GSE. Pre-planned or assigned work does not include work normally done at the using site. Pre-planned or assigned work may be defined on assembly drawings or individual element flight configuration drawings for Space Station hardware or software or on design drawings for associated GSE. The Program Office shall maintain a consolidated listing and description of all approved pre-planned or assigned work by implementing site. The Prime Contractor shall identify pre-planned or assigned work as early as possible during the manufacturing or factory assembly process and shall submit the preplanned or assigned work for baselining by the SSCB. Identification of pre-planned or assigned work shall be coordinated with and approved by the using site at least 9 months prior to CI delivery and shall be approved by the SSCB at least 6 months prior to end item delivery. After preplanned or assigned work baselining and until one month prior to using site acceptance of an end item, changes or additions to pre-planned or assigned work which result in a transfer of effort require SSCB approval. Uncompleted work identified later than one month prior to using site acceptance of an end item shall be dispositioned in accordance with paragraph 3.4.11.2. Each program organization requesting authorization for pre-planned or assigned work shall submit a Change Memo containing, as a minimum, the following information:

3.4.10.1.A Identification by title and reference to applicable drawings or documentation for the item to be deferred

3.4.10.1.B Reason for deferral

3.4.10.1.C Identification of the manufacturing site requesting deferral and the accomplishing site where the work is to be accomplished.

3.4.10.1.D Estimated man hours for using site accomplishment of the item

3.4.10.1.E Delta program cost incurred by deferral of the work

3.4.10.1.F Date or event for completion of the deferred work (flight, test, scheduled milestone, technical constraints)

3.4.10.1.G Need dates and on dock dates for material, engineering, etc., coordinated with the accomplishing site prior to submittal of the Change Memo.

3.4.10.1.H Resources (dollars and manpower) to be transferred from the site requesting deferral of the work to the site that is to accomplish the work

3.4.10.1.I Effectivity

3.4.10.1.J Summary of coordination accomplished with other affected organizations.

3.4.10.2 UNPLANNED OR DEFERRED WORK

Uncompleted work originally planned to be accomplished but not completed at the manufacturing site and changes or additions to the preplanned or assigned work baseline that are identified between 1 month prior to the Acceptance Review (AR) and the formal AR shall be presented at the AR as a delta to the previously identified preplanned or assigned work and shall be identified as deferred work. This list shall b3e included in the open work section of the ADP. For flight hardware or software, this work shall be approved by the Program Manager of his designated representative by signing Endorsement no. 1 of the Certification of Flight Readiness (CoFR). For GSE, Program approval of unplanned or deferred work shall be obtained by expedited Change Memo submittal of data requirements in accordance with paragraphs 3.4.10.1.A through 3.4.10.1.J. Precoordination with the using site shall be accomplished.

The listing of unplanned or deferred work shall include the information identified in paragraphs 3.4.10.2.A through 3.4.10.2.I below plus identification of the systems invalidated by the unplanned or deferred work and the revalidation requirements.

3.4.10.2.A Identification by title and reference to applicable drawings or documentation for the item to be deferred

3.4.10.2.B   Reason for deferral

3.4.10.2.C   Identification of the manufacturing site requesting deferral and the accomplishing site

3.4.10.2.D   Estimated man hours for using site accomplishment of the item

3.4.10.2.E   Delta Program incurred by deferring the work

3.4.10.2.F   Date or event for completion of the deferred work (flight, test, scheduled milestone, technical constraints)

3.4.10.2.G   Need dates and on dock dates for material, engineering, etc., coordinated with the accomplishing site

3.4.10.2.H   Resources (dollars and manpower) to be transferred from the deferring site to the site that is to accomplish the work

3.4.10.2.I   Effectivity

3.4.11 CHANGE PROCESSING AFTER FLIGHT READINESS REVIEW

3.4.11.A   During the Flight Readiness Review (FRR), the Prime Contractor and Kennedy Space Center (KSC) shall submit an annotated list (with necessary details) covering those changes, approved prior to the FRR, which have not completed implementation. Included in this change category are deferred hardware installations and changeouts. Work on changes already in process shall not be stopped unless specifically authorized by the Program Director or his designated representative. The list, as approved at the FRR, shall become part of the FRR baseline.

3.4.11.B   Potential changes after FRR that are under consideration by NASA organizations or the Prime Contractor shall be provided to the NASA Program Office for disposition. NASA Program Office procedures for control of changes to delivered hardware or software shall apply. Final disposition by the NASA Program Director or his designated representative shall be accomplished through the mechanism of the SSCB. Should the change be disapproved, the affected organization shall be informed immediately.

3.4.12 POST DD250 H/W MAKE OPERABLE CHANGE

Delivered hardware which is only located at KSC, requiring schedule critical changes, shall be modified after DD250 but prior to launch as directed by a KSC Material and Engineering Review Board (MERB), or appropriate board, as an approved make operable change. This is described in the ISS MERB Joint Program Directive (JPD-305). The disposition shall be documented on a change request/change directive (CR/CD).

3.4.13 POST LAUNCH ON-ORBIT H/W CHANGE

Hardware which is located on-orbit requiring a change, shall be modified as directed by the Mission Management Team (MMT). This is described in the ISS MMT Partner Program Directive (PPD-507). The disposition shall be documented on a change request/change directive (CR/CD).

3.5 CONFIGURATION ACCOUNTING

Configuration accounting is the element of CM that provides the essential records and reporting of precise configuration data for all Space Station hardware and software.

3.5.1 NASA BASELINE ACTIVITY INDEX AND STATUS REPORT

The NASA Program Office shall develop and maintain a current listing of all Program baseline documentation and identify current revisions and any unincorporated change notices. NASA design activities/contractors shall maintain similar data on internal baseline data.

3.5.2 ACCOUNTING DATA CROSS REFERENCE

NASA organizations and the Prime Contractor shall have and maintain a change identification, approval, and implementation cross-reference system which correlates the contractor change control documents to the NASA baseline change control documents. For example, this system shall reference the contractor change control documents down to and including engineering drawing and Engineering Order (EO) release and modification package identification to the NASA change direction.

3.5.3 CONFIGURATION STATUS ACCOUNTING

Configuration accounting and verification functions shall maintain or have access to complete and accurate records on the configuration status of all hardware/software including Government Furnished Equipment (GFE). These records shall be the responsibility of the design prime contractor until NASA assumes control of the hardware/software configuration data.

3.5.4 DETAILED HARDWARE CONFIGURATION ACCOUNTING

An accounting and verification system shall be implemented by the design Contractor to ensure that the detailed configuration of all program hardware is properly identified and verified.   This system shall enable as-built data to be compared with as-designed data with any differences being identified and resolved. These data shall be available down through the assembly levels to include the lowest serialized piece part level for contractor supplied items and shall, as a minimum, include traceability to the same level for subcontractor and supplier data.

The system used to describe the as-designed and the as-built configurations shall provide for an accurate comparison.

The system shall be capable of identifying parts and their precise configuration at any level of assembly.

The configuration verification system for GSE shall be controlled during the manufacturing planning, fabrication, ground processing, and station assembly and operations phases. The configuration verification system must accurately describe the as-designed and as-built configuration during the test, acceptance, and operations phases.

3.5.5 CHANGE STATUS ACCOUNTING

Records on the status of changes being managed by the prime contractor/NASA Design Activity shall be monitored by the Program Office Configuration Management Office (CMO). These records shall enable an audit trail to be accomplished from approval of each Change Memo through verification of change implementation. The records shall include a cross reference to the following, where required:

— Change Memos

— Change proposals

— Baseline documentation status

— ICD status

— Technical Directives

— Contract change authorization (if applicable)

— Modification kits

— Deviations, waivers, and non-compliances

Status accounting reports shall be used to support acceptance and delivery of hardware and software as well as for reviews and inspections. Appropriate summaries, evaluations, and status reports shall be prepared from this data for submittal to NASA management as required.

3.6 CONFIGURATION VERIFICATION

CM includes activities associated with assuring that requirements are properly implemented and traceable and that the hardware and/or software is certified/verified as having been designed and built to the correct approved configuration baseline.

3.6.1 DESIGN REVIEWS AND AUDITS

Each Space Station Program team, having authority for the development and control of hardware/software elements shall ensure that all higher level requirements and interfacing requirements have been properly allocated and implemented. Requirements reviews, design reviews, and configuration audits shall be conducted on all deliverable hardware and software to ensure requirements flowdown and implementation. These reviews shall establish baselines for further development and to verify the design approach.   Design reviews and audits may be conducted as incremental reviews in order to allow design of the Space Station to proceed in the most efficient manner.

When the design of a particular CI/CSCI is sufficiently mature the appropriate design review/audit shall be conducted. These reviews shall be progressive in nature, based on successful completion of lower level reviews.

3.6.1.1 DESIGN REVIEWS

3.6.1.1.1 SYSTEM REQUIREMENTS REVIEW

In order to set requirements for the Space Station Program, a System Requirements Review (SRR) shall be conducted to establish the Functional Baseline. The SRR shall include review of the Space Station Program System Specification, the series of Segment Specifications, and associated Program Level documentation.

3.6.1.1.2 SYSTEM DESIGN REVIEW

In order to further evaluate the Space Station system preliminary design and architecture, a System Design Review (SDR) will be conducted. The SDR will include review of configuration item specifications and Part I Interface Control Documents.

3.6.1.1.3 PRELIMINARY DESIGN REVIEW

Preliminary Design Reviews (PDRs) shall be a technical review of the preliminary design approach and allocation of system requirements to the individual CI/CSCI. PDRs shall be conducted early in the design phase and shall follow the guidelines of MIL-STD-1521 as tailored by the individual PDR Plan. Data to be presented shall include applicable CI/CSCI Development Specifications, Interface Documentation, design analyses, general layouts, updated plans, and any available design drawings/documentation. The System level or Stage PDR shall be accomplished as part of a series of Stage Integration Reviews (SIRs) as specified in paragraph 3.6.1.1.5.

3.6.1.1.4 CRITICAL DESIGN REVIEW

Critical Design Reviews (CDRs) shall be conducted to review the detail design of the CI/CSCI against the allocated requirements previously reviewed at PDR/SDR. CDRs will be conducted when the detail design is essentially complete and will follow the guidelines of MIL–STD–1521 as tailored by the individual CDR Plan. Data to be presented include detail design drawings, material and process specifications, schematics, test data, interface documentation, mockups and models, verification plans, CI/CSCI Product description documentation, and other related data. Completion of the CDR will result in authorization to complete the detail design and initiate hardware/software manufacture/coding. The System level or Stage Critical Design Review shall be accomplished as part of a series of Stage Integration Reviews (SIRs) as specified in paragraph 3.6.1.1.5.

3.6.1.1.5 STAGE INTEGRATION REVIEW

The ISS Stage Integration Review (SIR) is not a single review but a series of incremental reviews which will be conducted multiple times a year for specific groupings of Stages who's launch dates falls within an L-20 +/- 2 month time frame, in order to evaluate Stage design against the baseline requirements as defined in the SIR Technical Baseline Memo. The SIR objectives are: (1) to demonstrate the inter-element and inter-system functionality of elements and subsystems for current and future Stage interfaces, (2) Validate that equipment and operations will support the successful launch, on-orbit assembly, activation, and operation of each Stage, (3) Establish that Stage equipment and the associated operations will support the integration of follow-on Stages through assembly complete, (4) Demonstrate that Launch Package end-item designs, supporting documentation, analysis products, and plans are at the maturity level necessary for mission integration, (5) Demonstrate that the integrated Stage meets the requirements specified in the Assembly Implementation Requirements Document (AIRD).

3.6.1.2 CONFIGURATION AUDITS

3.6.1.2.1 FUNCTIONAL CONFIGURATION AUDIT

FCAs shall be conducted to determine that the allocated requirements as defined in the CI/CSCI Development Specifications, have been met and to verify the functional configuration of the item. FCAs will be conducted following completion of CI/CSCI verification and will follow the guidelines of MIL-STD-1521. Data to be presented will include detail design drawings, verification test/analysis reports, acceptance test data and other related data/documentation.

3.6.1.2.2 PHYSICAL CONFIGURATION AUDIT

PCAs shall be conducted upon successful completion of the CI/CSCI FCA and immediately prior to hardware/software acceptance and will follow the guidelines of MIL-STD-1521. PCAs shall verify that the released engineering drawings and product definition documentation adequately and accurately describe the as-designed configuration of the item and the related manufacturing planning (as-built configuration) properly incorporates those requirements. Upon completion of PCA the Product Baseline of the CI/CSCI will be established. The specific data which shall be included in the ADP and the ADP preparation instructions are defined in SSP 30695.

NOTE: NASA approval of, or concurrence with, the NASA design activity or contractor design is not to be construed as divestment of the design organization's basic design responsibility.

3.6.2 READINESS REVIEWS

3.6.2.1 OPERATIONS READINESS REVIEW

One month prior to First Flight Hardware Delivery (FFHD) for First Element Launch (FEL) processing and two months before each subsequent launch, an Operations Readiness Review (ORR) shall be conducted to assess the status of (1) crew and ground support team training, (2) the flight and ground console operations data set, (3) the Space Station Control Center (SSCC), (4) other Space Station Program and user support facilities (including the orbiting Space Station Program configuration for the operations interval being reviewed), and (5) the status of Space Station Program interfaces relative to Space Station crew and cargo.

3.6.2.2 FLIGHT READINESS REVIEW

FRRs shall be held by the NASA Program Office prior to each Space Station launch. At the FRR, each organization responsible for a major flight element shall formally certify its flightworthiness. The review includes assembly hardware; crew equipment; Flight Support Equipment (FSE); GSE, and associated support hardware payload support equipment, and other elements as specified by the NASA Director, Space Station. After the review and evaluation, a CoFR shall be executed by the NASA Director, Space Station.

3.6.3 OTHER SPACE STATION PROGRAM REVIEWS

Other program reviews may be required by the Program Manager, to support specific program requirements and milestones and to evaluate total program progress. Though not formally defined as CM milestones, these reviews shall be supported as required by the SSCB configuration identification and accounting system. These reviews shall be conducted as scheduled Program milestones to ensure coordination and integration of the flight and supporting hardware and software necessary to accomplish Program objectives.

3.6.3.1 ACCEPTANCE REVIEWS (ARs)

Acceptance Reviews are conducted prior to an endorsement of the CoFR and signing of the DD250 to transfer accountability of the hardware and software products to NASA.

An AR will be used to verify that no activity has occurred to change the configuration of the CI/CSCI flight hardware and software since the PCA. It shall include the identification and acceptance of open work by the using site after delivery. Preplanned, assigned, unplanned, or deferred work associated with the item being subject to the AR, will be presented in summary at the review and agreed upon by the Program Manager. Issues or concerns derived from the work transfer or deferral shall be identified to the Program Manager at this review for resolution. Upon completion and as part of the CI/CSCI AR for flight hardware and software, NASA and the prime contractor shall execute an endorsement of the CoFR and DD250.

Delivery of software application products/software patches/PPLs and associated documentation that modify software that has previously been accepted by NASA and must be changed shall be processed in accordance with the appropriate paragraph below:

A. The initial delivery of a software application product release shall be delivered in accordance with the DIL via a DD250.

B. Changes to and/or modifications of that initial delivery of a software application product release and associated documentation that have completed an FCA/PCA, whether a full recompile, a software patch, or as a PPL shall be accomplished via a NASA Avionics Software Control Panel (ASCP) approved Change Request/Change Directive (CR/CD). The software modifications including the software application product version releases, patches, and PPLs will be delivered as DATA and not as a modification package as identified in paragraph 3.4.8 (and subparagraphs). This data delivery will be accomplished via a Data Transmittal Form (DTF), in accordance with the applicable Data Requirements Description (DRD).

C. Software application products and associated documentation that have not completed an FCA/PCA and are still in development, i.e., engineering and interim releases, will be delivered as DATA and not as a modification package. This data delivery will be accomplished via a Data Transmittal Form (DTF), in accordance with the applicable Data Requirements Description (DRD).

A software delivery audit is conducted to document the configuration of the software product that is being delivered pre FCA/PCA during development phase, i.e. engineering and interim. It shall include the identification of the Integrated Flight Load (IFL) and the Version Description Document (VDD). The software product data delivery audit will provide for the acceptance of software product as a "Deliverable Data Item" in accordance with the applicable contract Data Requirements Description, via a Data Transmittal Form (DTF). Upon completion and as the final part of the audit, NASA and the Prime Contractor shall execute a DD1149 to transfer accountability of the delivered Software product(s).

3.6.3.2 SUSTAINING ENGINEERING SOFTWARE DATA DELIVERY AUDIT

A Sustaining Engineering software p data delivery audit is conducted to verify the configuration of a Sustaining Engineering Software application product/software Patch/PPL to a CI/CSCI that has been previously delivered to NASA, via DD250. It shall include the identification of the Integrated Flight Load (IFL), the IFL Build specification the results of the Formal Qualification Test (FQT)/Stage Test, the Patch Description Document (PDD), the Version Description Document (VDD), and a delta software Acceptance Data Package (ADP). The Sustaining Engineering software patch data delivery audit will provide for the acceptance of the Sustaining Engineering software patch as a "Deliverable Data item" in accordance with the applicable contract Data requirements Description, via a Data Transmittal Form (DTF). Upon completion and as the final part of the audit, a DD1149 shall be executed by NASA and the Prime Contractor to transfer accountability of the delivered Software Patch/PPL.

3.6.4 CONFIGURATION MANAGEMENT AUDITS

NASA CM shall conduct periodic CM audits of the Prime Contractor and other Program Participants CM systems, as required. These audits shall assess compliance with the requirements of this document and, as a minimum, shall address: organization, identification, change control, status accounting, verification, and interface control.

APPENDIX A ABBREVIATIONS AND ACRONYMS

A.1 REVISIONS

Responsibility for control of configuration management abbreviations and acronyms changes is delegated to the ISS program CM organization.

This appendix will be revised as required, and changes will be issued as replacement pages or by complete revision of the appendix as appropriate.

A.2 ABBREVIATIONS AND ACRONYMS

ADP	Acceptance Data Package
AIRD	Assembly and Implementation Requirements Document
AR	Acceptance Review
CDR	Critical Design Review
CEI	Contract End Item
CI	Configuration Item
CM	Configuration Management
CMO	Configuration Management Office
CMP	Configuration Management Plan
CoFR	Certification of Flight Readiness
CSCI	Computer Software Configuration Item
DCN	Document Change Notice
DR	Data Requirement
ECP	Engineering Change Proposal
EO	Engineering Order
FCA	Functional Configuration Audit
FEL	First Element Launch
FFHD	First Flight Hardware Delivery
FRR	Flight Readiness Review
FSE	Flight Support Equipment

GFE	Government Furnished Equipment
GSE	Ground Support Equipment
ICD	Interface Control Document
IRD	Interface Requirements Document
IRN	Interface Revision Notice
ISS	International Space Station
KSC	Kennedy Space Center
MIL	Military (As in Military Specifications)
MOD	Mission Operations Directorate
NASA	National Aeronautics and Space Administration
ORR	Operations Readiness Reviews
PCA	Physical Configuration Audit
PCP	Program Change Proposal
PDR	Preliminary Design Review
SCN	Specification Change Notice
SDD	Software Design Document
SDR	System Design Review
SIR	Stage Integration Review
SRR	System Requirements Review
SSCB	Space Station Control Board
SSCC	Space Station Control Center
SSCN	Space Station Change Number
SSP	Space Shuttle Program
STD	Standard
TBD	To Be Determined

U.S.   United States

VDD   Version Description Document

APPENDIX B GLOSSARY

B.1 CONTROL AUTHORITY

Responsibility for control of configuration management glossary of terms is delegated to CM.

This appendix will be revised as required, and changes will be issued as replacement pages or by complete revision of the appendix as appropriate.

B.2 GLOSSARY

ACCEPTANCE BASELINE

The configuration baseline established as a result of the configuration inspections and acceptance reviews. Changes to the configuration items in the product baseline shall be approved by the Government.

ALLOCATED BASELINE

The Allocated Baseline is the Type B development specifications and related documentation.

AS-BUILT CONFIGURATION

An actual, physical configuration of a unit of hardware or software.

AS-DELIVERED CONFIGURATION

The as-built configuration at the time of delivery.

AS-DESIGNED CONFIGURATION

A configuration formally approved by the NASA design activity or contractor engineering release authority.

AS-QUALIFIED CONFIGURATION

An as built configuration that was certified to have satisfactorily passed specified qualification tests.

AS-TESTED CONFIGURATION

An as-built configuration at the time of a specified test.

ASSEMBLY

Specific arrangement of two or more attached parts.

BASELINE CONFIGURATION

A specific configuration included in NASA design activity or contractor baseline documentation.

CHANGE CLOSEOUT

The process whereby the detailed definition (design) of an engineering change is declared complete and no further engineering data may be released against that specific change.

CHANGE PACKAGING

The integrating and assembling of the total change documentation (change proposals of all affected parties, IRNs, etc.).

CHANGE TRACKING

A function of configuration management which tracks each change from initial notification of submittal through disposition, direction to the design activity or contractor, and incorporation.

COMPUTER FIRMWARE

An assembly composed of a hardware unit and a computer program integrated to form a functional entity whose configuration can not be altered during normal operation. The computer program is stored in the hardware unit as an integrated circuit with a fixed logic configuration that will satisfy a specific application or operational requirement.

COMPUTER SOFTWARE CONFIGURATION ITEM

The CSCI is a designation applied to software or any of its discrete portions, which satisfies an end user function and is designated by NASA as a deliverable item. CSCIs shall be formally accepted on a DD Form 250 or its equivalent.

CONFIGURATION ACCOUNTING

The task of maintaining, correlating, reporting, and storing configuration documentation for program baselines hardware and software.

CONFIGURATION BASELINE

The approved and defined configuration which is used as a reference for program planning and implementation purposes and as a point of departure for control of changes.

CONFIGURATION BASELINE DOCUMENTATION

The set of documents that records a baselined configuration.

CONFIGURATION CONTROL

The task of ensuring that each proposed change, waiver, or deviation is properly defined, coordinated, evaluated, and dispositioned by the appropriate authority prior to its implementation.

CONFIGURATION IDENTIFICATION

The task of determining the manner in which each unit of hardware or software is to be described and of placing these descriptions in configuration documentation.

CONFIGURATION ITEM

Those system elements whose functions and performance parameters must be defined and controlled to achieve the overall system performance.

CONFIGURATION MANAGEMENT

The task of integrating and accomplishing, in an optimal manner, the four subtasks of configuration identification, configuration control, configuration accounting, and configuration verification.

CONFIGURATION VERIFICATION

The task of assuring that the program hardware and software and firmware is certified as having been designed, built, and tested to the correct configuration baseline. Configuration verification consists of a series of design reviews and configuration audits including change implementation verification.

CONTRACT END ITEM

The Contract End Item (CEI) is a designation applied to a Configuration Item or Computer Software Configuration Item which is an aggregation of hardware or software, or any of its discrete portions, which satisfies an end use function and is designated by NASA as a deliverable end item. CEIs shall be formally accepted on a DD Form 250 or equivalent. CEIs are line items in the contract or furnished by NASA in–house design activities. A CEI may be a separate CI, a separate CSCI, or an aggregate of CIs/CSCIs grouped as a set to be delivered to satisfy a contract.

DESIGN REVIEW

Systematic and formal reviews to verify technical requirements, to validate approaches taken to satisfy the requirements, and to establish configuration baselines for further development.

DEVIATION

A specific authorization, granted before the fact, to depart from a particular baseline requirement for a limited application.

DOCUMENTATION

One mode of information communication. This includes management and technical data current as of a given point in time and may be used to reflect contractor to customer and/or contractor to contractor agreements and procedures. This includes such items as program plans, procedures, specifications, ICDs, reports, technical publications, training documentation, etc.

DRAWING

See ENGINEERING DRAWING.

DRAWING NUMBER

A number placed on an engineering drawing for identification and accounting purposes.

DRAWING TREE

A list, by drawing number, of engineering drawings so arranged that for any one drawing, the next higher assembly drawing and the set of next lower assembly or part drawings are easily identified.

EFFECTIVITY

The specific hardware or software family and serial number(s), specific missions, to which part numbers, changes, waivers, etc., are identified.

ENGINEERING DRAWING

An engineering document that discloses (directly or by reference) the physical and functional end product requirements of an item.

ENGINEERING ORDER

The Engineering Order (EO) is a document prepared by the design activity or contractor to describe a change(s) to released engineering documentation.

ENGINEERING RELEASE SYSTEM

The single, authoritative control system used by NASA design activity/contractors for assigning document numbers, verifying requirements and approvals, and recording and transmitting engineering documentation required for fabrication, installation, and test of program hardware or software.

FUNCTIONAL BASELINE

The Functional Baseline consists of the Space Station System specifications and the System/Segment specifications, as well as the Interface Requirements Documents with the International Partners and external programs.

FUNCTIONAL VERIFICATION

The task of assuring that hardware or software functions per the design requirements.

HARDWARE

Items of identifiable equipment including piece parts, components, assemblies, subsystems, and systems.

INFORMATION

Knowledge communicated by electronic, verbal, visual or paper media.

INSTALLATION NOTIFICATION

The official action and/or document used after formal hardware/software delivery to update the Configuration Management System and to inform the cognizant design activity or contractor that a particular modification package has been installed, tested, verified, and accepted in accordance with its associated change instruction.

INTEGRATION

The task of assuring that all of the program or project elements perform in such a manner that collectively they will accomplish the program or project objectives in the most efficient manner.

INTERCHANGEABILITY

Interchangeability is defined to be when two or more items possess such functional and physical characteristics as to be equivalent in performance and durability and capable of being exchanged one for another without alteration of the items themselves or adjoining items except for adjustment and without selection for fit or performance. Functional and physical characteristics which would constitute interchangeability are as follows: Items must have the same design envelope and have no use limitations imposed. Items must utilize the same attachments, mountings, or mating surfaces. Attachments, connectors, wiring, GSE, and tubing must be the same to the extent that no rework is required on installation. Items must meet all baselined design requirements for performance. Performance or durability design requirements include the same safety, strength, electrical, mechanical, reliability, maintainability, tolerance, balance, and weight requirements. Items must have the same adjustments, testing, operation, and maintenance requirements and the same design to the extent that the same test procedures, specifications, and operating procedures may be utilized.

INTERFACE

A region common to two or more elements, systems, projects, or programs characterized by mutual physical, functional, and procedural properties.

INTERFACE CONTROL DOCUMENT   (ICD)

Program-level controlled document that contain drawings and documentation recording the common design features between two or more interfacing designs. The document defines and controls the physical and functional interfaces between two programmatic entities, e.g., between U.S. provided flight elements or U.S./International Partner flight elements.

INTERFACE REVISION NOTICE

The Interface Revision Notice (IRN) is a standard form used to record changes to an approved ICD.

MODIFICATION

A physical change to delivered hardware and/or software including spares.

MODIFICATION PACKAGE

A packaging of all hardware, software, and documentation required to perform a modification or correct a noncompliance to delivered equipment. A modification package consists of a modification kit which is the hardware and modification instructions for installing the kits on Space Station hardware and firmware with approved ECPs.

NASA DESIGN ACTIVITY

Those NASA offices not part of the ISS Program Office (e.g., KSC, MOD, Shuttle) charged with responsibility to develop and document the design for specific elements.

NONCOMPLIANCE

A condition that exists or will exist when a deliverable item or its related documentation is not in accordance with NASA baseline at the time of established contractual events.

NONCONFORMANCE

A condition of any article or material or service in which one or more characteristics do not conform to requirements. This includes failures, discrepancies, defects, and malfunctions.

PART

One of the portions into which something is, or is regarded as, divided and which together constitutes the whole.

PART NUMBER

A number applied to a part for identification and accounting purposes. Part numbers shall control fabrication, assembly, and replacement of all items and parts at all levels, including the CEI itself.

PREPLANNED WORK

Preplanned or assigned work is open work planned for accomplishment at the using site because of the following: (1) it is more desirable from a Program standpoint; (2) it is deferred for safety reasons; (3) it is required to restore the item from alterations or differences necessary for shipping; or (4) it allows configuration item delivery schedules to be maintained even though component delivery schedules have been slipped.

PRODUCT BASELINE

The Product Baseline is the Engineering Drawings and Associated Lists and Software Design Documents.

PROGRAM

The consolidation and integration of all efforts required to accomplish a stated objective.

RELEASED ENGINEERING DOCUMENTATION

Documentation that has been officially transmitted through the engineering release system and recorded in the engineering release record.

REQUIREMENTS TRACEABILITY

The ability to identify like and related requirements so that traceability of these requirements can be established up and down through the various levels of baseline documentation.

SOFTWARE

Computer programs required to design, test, checkout, maintain, or operate program hardware.

SPECIFICATION

Statement of particulars such as performance, characteristics, requirements, and configuration for a given element of hardware or software.

SUBASSEMBLY

With respect to some reference assembly, an assembly which is wholly contained within the reference assembly.

SUBSYSTEM

A combination of sets, groups, etc., that performs an operational function within a system and is a major subdivision of the system.

SYSTEM

A composite of all the activities, hardware, and software required to accomplish a set of program objectives, e.g., the Space Station system.

TECHNICAL DATA

Recorded information, regardless of form; used to define, produce, test, evaluate, modify, deliver, support, maintain, or operate a configuration item. Technical data may be recorded as: graphic or pictorial delineations in media such as drawings or photographs; text in specifications or related performance or design type documents; in machine forms such as punched cards, magnetic tape, disks, computer memory printouts, or computer memory. Examples of technical data include engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identifications, commercial item descriptions, logic diagrams, flow charts, and minutes of technical reviews and configuration audits. Research and engineering data are included, but financial and administrative data are excluded.

UNPLANNED WORK

Unplanned or deferred work is the open work which is required to be accomplished prior to acceptance and delivery of the configuration item.

WAIVER

A written authorization to accept an item that is found during production, or after having been submitted for technical review, tests or inspection, to depart from a particular performance or design requirement of a specification, drawing, or other contract document. The authorization is granted for a specified number of items and/or a specific period of time. The item(s) is/are considered suitable for use "as is" for a specified period of time or quantity of items.